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No Days 2, 5 or 6

## FOR INTERNAL ROUTING ONLY

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\* GPO : 1966 O-797-276

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03 16 32 58 CDR Do you?  
03 16 33 00 LMP Yes.  
03 16 33 01 CMP You do?  
03 16 33 02 CDR I feel like I've been in the whole time like I've been here in the simulator.  
03 16 33 04 CMP Yes, that's right; me too.  
03 16 33 05 CDR I've been lying on my - -  
03 16 33 06 CMP The only difference is that this is - -  
03 16 33 07 LMP I feel like I'm in the DCPS.  
03 16 33 08 CDR Oh, really?  
03 16 33 09 LMP Yes.  
03 16 33 13 CMP Okay - -  
03 16 33 14 LMP ... little bit.  
03 16 33 24 LMP I'm giving these an extra little whack here just so there won't be any surprises.  
03 16 33 35 CMP (Singing)  
03 16 33 52 CMP 42 is a pretty small star, too: Peacock.  
03 16 34 19 CMP Why don't you let the old DAP take it from here?  
03 16 34 21 CDR I'm going to. As soon as we get in close, I'm going to give it to the DAP. It's going faster than the DAP can take ... roll ... it's going the way we want it to go.  
03 16 34 30 CMP You going to align the GDC here? (Yawn)  
03 16 34 35 CDR Yes. I left it this way so we can tell where we're pointin  
03 16 34 39 CMP Oh.  
03 16 34 40 CDR I left her in ORB RATE.  
03 16 34 51 LMP Where's the earth; can you see it?

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8. 03 16 34 53 CDR No. Oh, it's out here, Bill - up this way.

03 16 34 57 LMP Okay. Getting the right antenna.

03 16 35 01 CMP Okay, so what we are going to do is pitch down this way, huh?

03 16 35 37 LMP We've got an earthset picture for *Life* magazine!

03 16 35 40 CDR We're there!

03 16 35 42 LMP Okay, are you there?

03 16 35 44 CDR Yes.

03 16 35 46 LMP Okay, you want AUTO trim?

03 16 35 50 CDR Yes, a little AUTO trim.

03 16 35 54 LMP Okay, CMC and AUTO.

03 16 35 55 CDR Right.

03 16 35 56 LMP Proceed.

03 16 35 57 CDR Right.

03 16 35 58 LMP Boresight and sextant star check.

03 16 36 00 CDR Okay.

03 16 36 01 LMP You're kind of in deep trouble for doing that.  
It's impossible.

03 16 36 05 CDR You're looking right at the moon.

03 16 36 06 LMP Yes, you have to wait awhile.

03 16 36 09 CDR Gee, that's a pretty interesting view, isn't it?  
That earthshine is bright.

03 16 36 12 CMP Let me take a look.

03 16 36 14 LMP When the earth sets, then we'll have enough - -

03 16 36 15 CDR Look down here.

03 16 36 17 CMP Huh!

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03 16 36 20 CDR See it?

03 16 36 21 CMP Oh, yes, I see it quite well.

03 16 36 26 LMP Oh, I might be able to get a star up there, though.  
What was the - what was my star?

03 16 36 30 CMP Your star was Scorpio Delta - Delta.

03 16 36 34 LMP And which way was it?

03 16 36 38 CMP Okay, it was down 06.9 -

03 16 36 44 LMP Yes.

03 16 36 46 CMP And lert 4.5.

03 16 36 48 CDR Oh, you'll never get that.

03 16 36 49 LMP Well, how in the hell would you ever get it?

03 16 36 50 CDR Well, there are some stars up here, see, that just - -

03 16 36 51 LMP Yes.

03 16 36 53 CMP Yes. But Scorpio is - -

03 16 36 54 LMP You're not going to be able to get it until damn  
near just prior to ignition.

03 16 37 00 CDR That's an inertial star.

03 16 37 02 LMP Yes, but you've got an inertial moon in your way.

03 16 37 04 CMP Well, if it - if the COAS - if you set the COAS  
and it doesn't hit the moon, then it's okay.

03 16 37 10 LMP That's right. It's kind of hard not to hit it though  
(laughter), looking down at it like this.

03 16 37 19 CMP I think you're looking at Saturn.

03 16 37 20 LMP Well, I can't even see ... I'm not getting in your way, am I?

03 16 37 26 LMP (Laughter) You guys - really bad!

03 16 37 31 CDR Alright, I'm going to put this thing INERTIAL - INERTIAL  
POWER, OFF; lighting, OFF; select one - IMU.

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1 03 16 37 50 CMP I could - I guess I could get out the optics and set the thing all the way up. All I'd have to do is wait until we get there.

03 16 38 03 CMP You guys could go ahead with the checklist without me in case I don't pick it up right away.

03 16 38 09 LMP Look at that red star going down there.

03 16 38 10 CDR I was trying to figure out what that was, too, Bill.

03 16 38 12 CMP It might be Antares.

03 16 38 16 LMP Boy, they set in a hurry, don't they?

03 16 38 21 CDR They sure do.

03 16 38 24 LMP Well, it's Scorpio, maybe it was - Yes?

03 16 38 30 CMP That wouldn't be setting now, would it?

03 16 38 32 CDR Yes, it would be. If it's going to be part of the boresight star, it's got to be near the horizon - near the plus-X axis.

03 16 38 46 CDR Okay, Bill, that should complete it.

03 16 38 48 LMP Okay.

03 16 38 54 CDR I won't be able to get a boresight star because we'll be in the daylight.

03 16 38 59 LMP What about Jim?

03 16 39 00 CDR Well, I don't know; I hope he can.

03 16 39 04 CDR Are you going to do that before we press on, Jim?

03 16 39 07 LMP When we get - when we get - -

03 16 39 10 CMP Why don't I just set - -

03 16 39 11 LMP - - your double umbra, why, you can do it then.

03 16 39 13 CMP What's this double umbra?

03 16 39 15 LMP Double shadow. When the earth sets, then you will be able to - you'll be looking at 90 degrees back and you can look right down on it.

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03 16 39 25 CMP When the earth sets?

03 16 39 26 LMP Yes, the umbra is the shadow.

03 16 39 27 CMP Oh, yes, okay.

03 16 39 30 LMP So we're in the shadow of the sun; that's the umbra of the moon, and when we're in the shadow of the earth, that's the umbra. You should be able to get a boresight star pretty soon, because we're going to come to the end of the -

03 16 39 41 CMP Are we? Okay, I'll go down there and set it up.

03 16 39 43 LMP Wait a minute. Where in the hell are we?

03 16 39 45 CDR Confusing.

03 16 39 48 CMP We're pitching down this way.

03 16 39 51 LMP We aren't doing anything - are we? Are we maneuvering?

03 16 39 54 CMP No, we're not. We're holding steady, but - -

03 16 39 55 CDR Here, let me show you - -

03 16 39 56 LMP Yes, that's right; we're not 90 degrees from our burn - from our burn place yet. If we're 90 degrees from our burn place, we'll be looking straight at the moon - -

03 16 40 03 CMP We're over here.

03 16 40 07 LMP We're coming this way.

03 16 40 08 CMP Yes, I know. And we're not upside down like that. We're - Well - You have - Your optics are up.

03 16 40 18 LMP Optics are posigrade. They'll go to up.

03 16 40 28 CDR We're going right through here.

03 16 40 58 CMP Okay, Bill, when do you start reading the 6-minute checklist?

03 16 41 03 LMP 6 minutes.

03 16 41 04 CMP What's that time in GET?

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03 16 41 07 LMP Well, let's see here. 89:19 we'll call it; let's make it 89:13, okay? And the 5 one will be at 89:14, and the 2 will be at 89:17 - 35 -

03 16 42 08 CMP I'm just looking where the PITCH 2 and YAW 2 circuit breakers are. I want to make sure you pull the right one.

03 16 42 14 CDR YAW 2 and PITCH 2.

03 16 42 16 CMP Okay.

03 16 42 26 CDR I'm really screwed up. It looks to me we ought to be going the other way.

03 16 42 30 CMP Yes, I know.

03 16 42 31 CDR Huh? Yes, well, look. Well, here we are right here.

03 16 42 34 CMP Oh boy!

03 16 42 35 CDR What's wrong?

03 16 42 36 CMP I should have got down here a long time ago.

03 16 42 39 CDR Here's where we're going to be when we burn, right?

03 16 42 40 LMP Yes, and we're right here now. See? And we're looking straight down at the moon, and the earth is over here.

03 16 42 54 CDR Are you doing your star check?

03 16 42 56 CMP Yes, right in a crater!

03 16 42 59 LMP Okay, you're not going to be able to do it until we get past this - -

03 16 43 04 CMP Now, if I can't do it until real late, go - Start without me.

03 16 43 10 LMP You'll be able to do it - You're 15 minutes - 20 minutes out of the burn.

03 16 43 42 CMP I wonder if the moon is made out of basically the same material as the earth is.

03 16 43 46 CDR I don't know.

03 16 43 48 LMP Probably is.

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03 16 43 52 CDR

Anders is going to tell you when he alights from the first LM - Pick up all the gold.

03 16 44 07 CMP

I think he doesn't have to; he knows it all right now. Didn't you hear him? Ye geologists of the world: I see a few grabens, a few slipped discs.

03 16 44 39 LMP

There's a strange light down there.

03 16 44 45 CDR

Is it a bonfire?

03 16 44 47 LMP

It might be campfires.

03 16 45 03 CMP

How does it look?

03 16 45 07 LMP

I think you're going to be able to see it pretty soon.

03 16 45 14 CMP

Well, I'll put it in and wait for it.

03 16 45 16 CDR

Okay.

03 16 45 20 CMP

Do I have the computer?

03 16 45 22 CDR

Yes, ENTER the -

03 16 45 30 CMP

Are you going to read this off to me?

03 16 45 32 CDR

Yes, what is it?

03 16 45 34 CDR

Bill?

03 16 45 35 LMP

Okay, I'm getting the timer.

03 16 45 42 LMP

Oh boy, we're going to get that damned thing to 10 again.

03 16 45 50 LMP

Okay. Have that time -

03 16 46 01 LMP

You got a star, Jim?

03 16 46 02 CDR

No, he needs it read off to him.

03 16 46 04 LMP

Okay, OPTIC MODE, CMC.

03 16 46 07 CMP

Okay.

03 16 46 08 LMP

In zero OFF.

03 16 46 09 CMP

Zero OFF.

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03 16 46 10 LMP VERB 41, NOUN 91, ENTER. Okay, we're going to lose them here pretty soon.

03 16 46 23 CMP Okay. The shaft is 09240, plus - -

03 16 46 33 LMP You want me to write - to log this?

03 16 46 34 CMP 09240. Okay. ENTER. And the trunnion is plus 25300. Plus 25300. ENTER.

03 16 47 14 LMP There's no trouble reading by flashlight.

03 16 47 19 CMP Oh, I don't have anything yet.

03 16 47 21 CDR Have you got the earth - the moon, I mean?

03 16 47 25 CMP I can't see either.

03 16 47 35 CMP I think I'm still on the earth - or the moon.

03 16 47 41 LMP What is your - what's your shaft and trunnion? Jim?

03 16 47 48 CMP Shaft is 02940.

03 16 47 51 LMP 02940, yes.

03 16 47 52 CMP Left 25.3 degrees trunnion.

03 16 47 55 LMP Oh, well, you're looking down at its eye. You've got to wait until you get down past the 90-degree point.

03 16 48 04 CMP I think I see it coming up.

03 16 48 09 CC Apollo 8, Apollo 8, Houston; 3 minutes LOS; all systems are GO. Over.

03 16 48 14 CDR Roger. Thank you, Houston; Apollo 8.

03 16 48 40 CMP I see the limb, and I see the stars coming up.

03 16 49 02 LMP Have you got optics power, zero - Oh, you haven't done that yet, huh?

03 16 49 06 CMP No, I'm waiting until I - until I see the star.

03 16 49 08 LMP Yes.

03 16 49 26 CMP How much time do we have?

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03 16 49 30 CDR Half an hour.

03 16 49 49 CMP There's our friend out there.

03 16 49 51 LMP You can really see Australia or something down there on the earth. ... I get earthset here in just a second.

03 16 50 08 CDR Any luck, Jim?

03 16 50 11 CMP It's coming up, but I think I can almost verify it right now because I have Gruis, and Peacock is in line with the bottom parts of Gruis, and this optics - -

03 16 50 18 CDR We're not in any hurry.

03 16 50 19 CMP - - is exactly in line with it. I know, I was just saying that we can almost verify it right now.

03 16 50 56 LMP This is a pretty - -

03 16 50 57 CC All systems are GO, Apollo 8.

03 16 50 58 LMP Look at that, look at that, Frank.

03 16 50 59 CDR Thank you.

03 16 51 00 LMP Look at the earth. *5:16:51 60 S*

03 16 51 03 CDR Yes.

03 16 51 04 CMP Setting?

03 16 51 05 CDR Yes.

03 16 51 08 LMP Yes, we're down in Carnarvon.

03 16 51 10 CMP Huh?

03 16 51 11 LMP Yes, we're down in Honeysuckle; that was Australia.

03 16 51 20 LMP You don't see that very often, do you?

03 16 51 47 CDR Okay?

03 16 51 50 CMP No, the moon's still there. I see it coming up. Stars are coming up, but the moon is still there. Now, if you guys want to go on a little further, go ahead without me.

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03 16 51 59 CDR Oh, we got a lot of time.

03 16 52 05 CMP I should see Peacock rise over that - I'm just amazed the way this thing operates.

03 16 52 24 CDR It's been a pretty fantastic week, hasn't it?

03 16 52 29 CMP It's going to get better.

03 16 52 31 CDR Yes.

03 16 53 09 CMP This is utterly fantastic, though. This pawl line is lined up exactly with Gruis.

03 16 53 27 CDR You know what I think made me sick that night?

03 16 53 29 LMP What?

03 16 53 30 CDR That damned pill I took.

03 16 53 32 LMP What pill did you take?

03 16 53 34 CDR Seconal - one of the big ones.

03 16 53 36 LMP Oh, is that right?

03 16 53 37 CDR I didn't know you had small ones. I'd have taken one of those.

03 16 53 42 LMP Maybe you just had the flu.

03 16 53 44 CDR Maybe I did, I don't know, but it seems like you guys would have gotten it.

03 16 53 50 CMP Well, I think that basically your stomach was just upset - because you can get it very easily - There's nothing wrong, you know.

03 16 53 54 CDR Yes, I know, but I never had it before, not even in zero-g airplane, which is a - a real -

03 16 54 39 LMP I hope this baby holds out for another 2-1/2 days. It sure has performed admirably, hasn't it?

03 16 54 44 CDR Yes.

03 16 54 52 CMP Gentlemen, Peacock should be rising above the moon right now.

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03 16 55 12 CMP And there it is. Just a minute, and I'll verify it.

03 16 55 33 CMP Okay, I confirm Peacock.

03 16 55 35 CDR Okay, Bill, checklist.

03 16 55 36 LMP Okay.

03 16 55 41 CDR You can leave that off - Looks like we're going to be burning in the daylight anyway.

03 16 55 47 LMP Okay. Drive trunnion if less than 5 degrees.

03 16 55 51 CMP Okay. Optics, zero, zero.

03 16 55 53 LMP And GEN POWER OPTICS, OFF.

03 16 55 55 CMP Optics, zero. Don't hit the IMU switch; OPTICS, OFF.

03 16 56 02 LMP Okay, why don't you - Frank, you can have your lights up, I guess - Unless you wanted to check your star.

03 16 56 09 CMP Too late, I'm not checking - -

03 16 56 10 LMP Frank, let me come down the other side.

03 16 56 12 CDR I doubt if I'll be able to.

03 16 56 13 LMP No, I mean around the other side.

03 16 56 17 LMP I guess you probably won't; you'll be pitched into the moon, won't you?

03 16 56 18 CDR Yes, that's the trouble, I - I just barely get - and then when I do see it, I see a lit horizon.

03 16 56 27 LMP Okay, VERB 37, ENTER; 40, ENTER.

03 16 56 35 LMP BMAG MODE, three, RATE 2.

03 16 56 36 CMP Just a minute.

03 16 56 43 CDR BMAG, RATE 2.

03 16 56 46 LMP SPACECRAFT CONTROL, CMC.

03 16 56 49 CDR CMC.

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03 16 56 50 IMP CMC MODE, AUTO.  
03 16 56 51 CDR AUTO.  
03 16 56 52 LMP Proceed.  
03 16 56 54 CDR Okay.  
03 16 56 59 LMP Okay, align spacecraft roll to GDC. You got -  
03 16 57 09 CDR Okay.  
03 16 57 10 LMP 16 minutes. Do you want to wait awhile to do this?  
03 16 57 13 CDR Well, it's already aligned. I'll do it now, Bill -  
I don't think I'll have to do much - Put in a little  
bit of yaw that way.  
03 16 57 29 IMP Okay, align spacecraft roll and GDC aligned. We'll  
trim it again here - before the burn.  
03 16 57 36 LMP STABILITY CONTROL SYSTEM's circuit breakers, panel 8, CLOSED.  
03 16 57 40 CDR Alright. Now, let's watch this, Jim.  
03 16 57 43 LMP Direct ullage -  
03 16 57 44 CDR Don't want to leave that out.  
03 16 57 45 LMP I'm going to check mine over here, too.  
03 16 57 51 CDR They're all CLOSED.  
03 16 57 52 LMP Okay, SPS circuit breakers CLOSED except for gaging.  
03 16 57 57 CDR Gaging OPEN, okay; PITCH 1, YAW - 2, PITCH - YAW 1,  
YAW 2. They're in.  
03 16 58 06 CMP They're in - okay.  
03 16 58 10 CDR Okay.  
03 16 58 11 LMP I'm just checking all mine here.  
03 16 58 15 CDR Don't push on them when you've got ...  
03 16 58 20 LMP I'll get them.

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8 03 16 58 26 LMP Okay, DEADBAND, MIN.  
03 16 58 29 CDR DEADBAND going to MINIMUM - MINIMUM!  
03 16 58 31 LMP RATE, LOW.  
03 16 58 32 CDR LOW.  
03 16 58 33 LMP LIMIT CYCLE, ON.  
03 16 58 34 CDR ON.  
03 16 58 36 LMP MANUAL ATTITUDE, three, RATE COMMAND.  
03 16 58 37 CDR RATE COMMAND.  
03 16 58 39 LMP BMAG MODE, three; ATT 1/RATE 2.  
03 16 58 42 CDR ATT 1/RATE 2.  
03 16 58 44 LMP ROTATIONAL CONTROL POWER DIRECT, both, OFF.  
03 16 58 47 CDR DIRECT. Okay, that's OFF.  
03 16 58 50 LMP SCS TVC, two, RATE COMMAND.  
03 16 58 53 CDR SCS TVC, two, RATE COMMAND.  
03 16 58 56 LMP TVC GIMBAL DRIVE: PITCH and YAW, AUTO.  
03 16 58 59 CDR AUTO.  
03 16 59 00 LMP And here's where we stop -  
03 16 59 01 CDR Alright.  
03 16 59 02 LMP For 13 minutes.  
03 16 59 27 LMP Boy, it's blacker than pitch out here.  
03 16 59 29 CDR Yes, I know it.  
03 16 59 37 CMP Okay, (yawn) you're going to burn with the lights on  
anyway, aren't you, because you've got to get sunlight.  
03 16 59 40 CDR Probably will, yes.

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03 16 59 44 CMP Yes, I watched the sun - I watched that star rise, and I could just see the black horizon - the moon fade away and the star come up and - right on it.

03 17 00 11 LMP Okay, if we get a MAIN A or an AC 1 failure, you change gimbal drives, right?

03 17 00 16 CDR Okay.

03 17 00 19 LMP You get a MAIN B or an AC 2 failure, don't change gimbal drives or do anything, except put your gimbals to - from AUTO to 1.

03 17 00 36 CMP (Singing)

03 17 01 24 LMP Do you see anything hanging around that could come down?

03 17 01 28 CDR I hope not.

03 17 01 53 CDR Tell you one thing these flights are good for: an old fatty like me, I bet I've lost a lot of weight. I didn't eat much those first two days, and I didn't - didn't even get much to eat today.

03 17 02 23 CDR When is the ignition, 89:19, huh?

03 17 02 27 LMP Yes.

03 17 02 29 LMP Pretty sunrise.

03 17 02 32 CDR Yes.

03 17 02 47 CMP I'm doing a P23 right after we leave this place, huh?

03 17 02 51 CDR Yes.

03 17 03 04 CDR Is it boiling, Bill?

03 17 03 06 LMP No, I hope not. It looks low. It's just cold in there.

03 17 03 21 CMP It does look a little low. When did I say I had the star?

03 17 03 28 CDR What time?

03 17 03 29 LMP Huh?

03 17 03 30 CMP Because we still have 60 degrees to go then, if we want to be parallel - perpendicular - horizontal to the horizon.

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03 17 03 39 LMP Perpendicular (laughter)! ...

03 17 03 40 CMP The horizontal, because I was 60 degrees down and I -  
I just saw the - -

03 17 03 47 LMP We're still looking at the moon - flat at the moon.

03 17 03 53 CMP Well, not really.

03 17 03 54 LMP Not flat at it.

03 17 03 55 CMP I hope not.

03 17 03 56 CDR Oh, no, not flat at it, but - Boy, it's black out there.

03 17 04 33 LMP If you don't get G&N ignition, what are you going to do?

03 17 04 36 CDR Go right to SPS.

03 17 04 38 LMP Wouldn't it be smart to take it around again?

03 17 04 40 CDR Why? If we didn't get it this time, why would we get  
it better the next time?

03 17 04 47 LMP The burn ... - -

03 17 04 48 CDR There's a 10-degree excursion on this thing.

03 17 04 53 LMP Make sure you hit the corridor.

03 17 05 14 CDR You're right. It would be smart to take it around again.

03 17 05 18 LMP Get set up to do an SPS burn, huh?

03 17 05 20 CDR AUTO SPS.

03 17 05 23 LMP I haven't looked at your G - you might still be able  
to get - -

03 17 05 27 CDR Wait a second; let me check it.

03 17 05 28 LMP - - to get G&N errors.

03 17 05 38 CMP (Singing, whistling)

03 17 06 17 LMP Now, you should see something - Yes, there it comes.

03 17 06 20 CDR Where do you see it?

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03 17 06 21 CMP 6 minutes to recheck.

03 17 06 22 CDR Oh, yes, it ...

03 17 06 24 LMP I see it off the side of the terminator from sunrise.

03 17 06 34 CMP I wonder if that - that sort of a zodiacal light was a glare off the optics, or something.

03 17 06 40 LMP ... You ought to draw a little picture of it, and people could tell you what it was.

03 17 06 49 CDR You got the gimbal thing handy right off the bat?

03 17 06 53 LMP Yes, why don't we write that down?

03 17 06 54 CDR Minus 0 - -

03 17 06 55 CMP/LMP - - 40 plus 157.

03 17 07 00 CDR Is it 157? Not 151?

03 17 07 06 CMP I'll check on the 11 pad. 157.

03 17 07 10 CDR Okay.

03 17 07 11 CMP ... in there.

03 17 07 13 LMP I bet we had the - The weight hadn't - the trim hadn't changed any since the last time. (Laughter) Getting worried there for a minute.

03 17 07 21 CMP We've been eating a lot of food.

03 17 07 24 CDR Let's see now, that's 2 - 2 minutes and 13 seconds, is that what we said? 2:18.

03 17 07 31 CDR 138 seconds.

03 17 07 34 CMP 2:18 must give you a slow return home.

03 17 07 35 CDR Yes, ...

03 17 07 37 LMP You got your strut in?

03 17 07 41 CDR Yes, it's in.

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03 17 07 44 LMP Probably, one of the things we've been hearing is these oxygen masks snapping up and down.

03 17 08 02 LMP Boy, it took three acts of Congress to get those little strings.

03 17 08 07 LMP Oh, that - that's peculiar, isn't it?

03 17 08 12 CDR Yes, looks to me like we're going right at it. Doesn't it look like that to you?

03 17 08 19 CMP Why is it we do all these burns upside down?

03 17 08 21 CDR So you can see.

03 17 08 23 CMP (Laughter) You want to look at that?

03 17 08 25 CMP/CDR (Laughter)

03 17 08 28 LMP If it makes you feel bad, look out the side windows.

03 17 08 31 CDR Yes, I think it would look better.

03 17 08 39 CDR I've got - coming up on 10 minutes.

03 17 10 12 CDR Okay, 9 minutes, right now on -

03 17 10 17 CDR MARK.

03 17 10 27 CMP (Singing)

03 17 10 42 LMP Hey, don't forget your ullage.

03 17 10 43 CDR Yes, gees, don't let me forget that!

03 17 10 45 LMP How many seconds do you need?

03 17 10 47 CDR 15 seconds.

03 17 10 48 CMP Four-jet ullage.

03 17 10 49 LMP Okay, we better write that down.

03 17 10 55 LMP Ullage will be at 89:19:01. Okay?

03 17 11 02 CDR Yes. You're going to call it off, right?

03 17 11 07 LMP Well, I'll try to remember - Got it in here.

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03 17 11 11 CDR Oh, yes.

03 17 11 14 CMP Yes, "ullage as required" down there, I got. You'll see the 15 seconds right on here.

03 17 11 20 LMP 15 seconds.

03 17 11 23 CDR Yes.

03 17 11 24 CMP ...

03 17 11 59 CMP All it does is let you see whether it is there or not; then if it is, it doesn't do anything.

03 17 12 03 LMP Yes, I know, but it drifts off a little. The deadband affects it, I guess.

03 17 12 07 CMP Oh.

03 17 12 16 LMP Boy, you think you're going to burn right into the water - I mean, right into the sand.

03 17 12 18 CMP Did you have trouble scooping up those type of rocks? You said you went up to West Texas for that.

03 17 12 24 CDR 7 minutes, coming up on 6 minutes.

03 17 12 27 LMP Okay.

03 17 12 28 CDR Let's go ahead and start.

03 17 12 39 LMP Okay, MAIN BUS ties are coming ON.

03 17 12 40 CDR Okay.

03 17 12 44 LMP A is ON; B is ON.

03 17 12 51 LMP Okay. SPS, TVC, two, RATE COMMAND; and TVC GIMBAL DRIVE, PITCH and YAW in AUTO. Recheck them.

03 17 13 01 CDR RATE COMMAND and AUTO.

03 17 13 02 LMP Okay, TVC SERVO POWER 1, AC 1, MAIN A.

03 17 13 05 CDR AC 1, MAIN A.

03 17 13 06 LMP 2, AC 2, MAIN B.

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03 17 13 09 CDR Right.  
03 17 13 10 LMP TRANSLATIONAL CONTROL POWER, ON.  
03 17 13 12 CDR TRANSLATIONAL CONTROL POWER, ON.  
03 17 13 14 LMP ROTATIONAL CONTROL POWER NORMAL 2, AC.  
03 17 13 17 CDR AC.  
03 17 13 18 LMP ROTATIONAL HAND CONTROLLER number 2, ARMED.  
03 17 13 22 CDR ARMED.  
03 17 13 28 LMP Stand by to start the GIMBAL MOTORS.  
03 17 13 30 CDR Okay.  
03 17 13 34 CDR Should I pull the circuit breakers?  
03 17 13 35 LMP No, not yet!  
03 17 13 37 CDR Okay, just checking.  
03 17 13 46 LMP Okay, let's start PITCH 1 and YAW 1.  
03 17 13 48 CDR Alright, ready; PITCH 1.  
03 17 13 50 LMP Got it.  
03 17 13 51 CDR YAW 1.  
03 17 13 52 LMP Got it.  
03 17 13 53 CDR Okay.  
03 17 13 54 LMP Okay, clockwise.  
03 17 13 55 CDR Clockwise.  
03 17 13 56 LMP Verify no MTVC.  
03 17 13 57 CDR No MTVC.  
03 17 14 00 LMP Okay. Start PITCH 2 and YAW 2.  
03 17 14 03 CDR PITCH 2.

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03 17 14 04 LMP Got it.

03 17 14 06 CDR YAW 2.

03 17 14 07 LMP Got it.

03 17 14 09 CDR Okay.

03 17 14 10 LMP Set GPI trim.

03 17 14 11 CMP Okay, minus 40, plus 157.

03 17 14 16 LMP Got it.

03 17 14 18 LMP Verify MTVC.

03 17 14 20 CDR MTVC.

03 17 14 21 LMP TRANSLATIONAL HAND CONTROLLER, NEUTRAL.

03 17 14 23 CDR NEUTRAL.

03 17 14 25 LMP GPI returns to zero.

03 17 14 27 CDR Zero.

03 17 14 28 LMP ROT CONTROL POWER NORMAL 2, AC/DC.

03 17 14 31 CDR AC/DC.

03 17 14 32 LMP Want to trim? Yes.

03 17 14 34 CDR Yes.

03 17 14 35 LMP Okay. BMAG MODE, three, RATE 2.

03 17 14 37 CDR RATE 2.

03 17 14 38 LMP S - SPACECRAFT CONTROL, CMC and AUTO.

03 17 14 40 CDR Right.

03 17 14 41 LMP Proceed.

03 17 14 42 CMP Proceed.

03 17 14 45 CDR Okay.

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03 17 14 47 LMP Okay, EMAG MODE, three, ATT 1/RATE 2.  
03 17 14 50 CDR ATT 1/RATE 2.  
03 17 14 51 LMP ENTER.  
03 17 14 52 CMP ENTER.  
03 17 14 54 LMP Okay. Gimbal test option, ACCEPT; SPACECRAFT CONTROL,  
CMC; verify.  
03 17 15 00 CDR Proceed, huh?  
03 17 15 01 LMP Proceed.  
03 17 15 02 CDR Right.  
03 17 15 03 CMP Proceed.  
03 17 15 04 LMP Call them out.  
03 17 15 05 CDR Alright. 20, minus 20, 00, 02, 0 minus 2, 00.  
03 17 15 20 CMP Whew!  
03 17 15 21 LMP 60 40; check your clock.  
03 17 15 24 CDR 60 40; clock is good.  
03 17 15 26 LMP ROT CONTROL POWER DIRECT, both, MAIN A, MAIN B.  
03 17 15 29 CDR MAIN A, MAIN B.  
03 17 15 30 LMP SPS HELIUM VALVES, both, AUTO.  
03 17 15 32 CDR Verified.  
03 17 15 34 LMP LIMIT CYCLE, OFF.  
03 17 15 36 CDR LIMIT CYCLE, OFF.  
03 17 15 37 LMP FDAI scale, 50/15.  
03 17 15 39 CDR 50/15.  
03 17 15 40 LMP Pull PITCH 2 and YAW 2.  
03 17 15 42 CDR Alright, watch this.

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03 17 15 43 CDR PITCH 2; YAW 2.

03 17 15 47 LMP Stand by for 2 minutes.

03 17 15 50 CDR Okay.

03 17 15 51 LMP How's your boresight star?

03 17 15 54 CDR Hey, listen. It looks to me like I'm going to burn right into the ground. Oh! There's the horizon. Hurray! We're going the right way.

03 17 16 02 LMP Boy, you sure can't tell when you're - -

03 17 16 03 CMP 3.2 degrees at  $T_{ig}$  minus 3.

03 17 16 07 CDR What is it?

03 17 16 08 CMP 3.2 degrees at  $T_{ig}$  minus 3 - right about now.

03 17 16 11 CDR Okay, I can - It looks good.

03 17 16 18 CDR We've got to arm this TRANSLATIONAL HAND CONTROLLER. Did you tell me to do that?

03 17 16 24 CDR Then, we've got to ullage.

03 17 16 25 LMP Yes.

03 17 16 40 CDR Okay, coming up on 2-1/2 minutes.

03 17 16 47 LMP Okay, 5 seconds after you start, get DELTA-V THRUST B, ON, okay?

03 17 16 52 CDR Okay, yes. Then I'm all set.

03 17 16 56 LMP Don't forget to start your watch, Jim. Reset it now.

03 17 16 59 CMP Yes, it's all reset.

03 17 17 03 LMP Okay, DELTA-V THRUST A, NORMAL.

03 17 17 06 CDR NORMAL.

03 17 17 07 LMP TRANSLATIONAL HAND CONTROLLER, ARMED.

03 17 17 09 CDR ARMED.

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03 17 17 10 LMP ROTATIONAL HAND CONTROLLER, both, ARMED.  
03 17 17 12 CDR ARMED.  
03 17 17 14 LMP TAPE RECORDER. - -  
03 17 17 24 CDR Okay.  
03 17 17 39 LMP How's it look?  
03 17 17 40 CDR Good.  
03 17 17 43 LMP I'm going forward (laughter).  
03 17 17 46 LMP Well, ... - -  
03 17 17 48 CDR ... a hell of a kick in the pants now, I'll tell you that.  
03 17 17 54 CDR The DSKY blanks at 35 seconds, right?  
03 17 17 56 LMP Right, it comes back on at 30; 15 seconds later you give it the ullage.  
03 17 18 05 CDR What'll I have?  
03 17 18 07 LMP TRANSLATION CONTROL.  
03 17 18 16 LMP You got one DELTA-V THRUST, ON?  
03 17 18 17 CDR One ON, one ON.  
03 17 18 18 LMP Okay.  
03 17 18 19 LMP A, ON.  
03 17 18 20 CDR A is ON.  
03 17 18 25 LMP Don't forget the -  
03 17 18 27 CDR 5 seconds.  
03 17 18 28 LMP 2 to 5 seconds.  
03 17 18 29 CMP Right.  
03 17 18 41 CDR Okay, she blanked.  
03 17 18 42 CMP She blanked.

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03 17 18 43 CDR Okay.  
03 17 18 45 LMP EMS MODE, AUTO.  
03 17 18 46 CDR AUTO.  
03 17 18 47 LMP FLIGHT RECORDER going to RECORD,  
03 17 18 48 CMP Stand by to start ullage.  
03 17 18 50 LMP Proceed.  
03 17 18 51 CMP Proceed.  
03 17 18 55 LMP I'll give you a mark for ullage.  
03 17 18 56 CDR Okay.  
03 17 18 58 CMP He's got it right here.  
03 17 19 00 LMP 17, 16 -  
03 17 19 02 CMP MARK.  
03 17 19 03 LMP Ullage!  
03 17 19 06 LMP Proceed when you need to.  
03 17 19 12 CMP Proceed.  
03 17 19 13 CDR I'm proceeding.  
03 17 19 16 LMP Two valves. Good shape - -  
03 17 19 21 CDR Two valves.  
03 17 19 22 LMP Four valves.  
03 17 19 32 CMP Pressure's holding.  
03 17 19 43 LMP It's looking real good.  
03 17 19 45 CDR Pressure ...  
03 17 20 16 LMP Burned for 1 minute.  
03 17 20 18 CDR Okay.

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03 17 20 51 LMP It's looking good.  
03 17 20 52 CDR Lock should ...  
03 17 21 12 LMP Coming up on 2 minutes.  
03 17 21 16 LMP 2 minutes.  
03 17 21 28 LMP 132 seconds.  
03 17 21 36 CDR We're going home. 135  
03 17 21 37 CMP Keep her going.  
03 17 21 44 CDR Boy, those g's are building up as it gets lighter.  
03 17 21 55 CMP Okay, we're coming down the pike.  
03 17 22 01 CDR We've got to trim this one, too.  
02 17 22 03 CDR 30 seconds.  
03 17 22 27 LMP Stand by.  
03 17 22 35 LMP 5, 4, 3, 2, 1 -  
03 17 22 40 LMP STOP.  
03 17 22 41 CDR Okay.  
03 17 22 42 LMP Well, that wasn't much of a cutoff there (laughter).  
03 17 22 44 CMP It sure wasn't.  
03 17 22 45 CDR Okay, let's go.  
03 17 22 47 LMP Okay. Four valves, CLOSED; helium, CLOSED; DELTA-V  
THRUST A and B - -  
03 17 22 50 CMP 26.4.  
03 17 22 51 LMP - - OFF.  
03 17 22 54 CDR DELTA-V THRUST A and B are OFF.  
03 17 22 57 LMP Okay, put the PITCH 2 and YAW 2 circuit breakers IN.  
Turn them OFF slowly.

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